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ABSTRACT

Most organizations planning to assess adverse impact or perform a stock analysis for affirmative action planning must correctly classify their jobs into appropriate occupational categories. Two methods of job classification were assessed in a combination archival and field study. Classification results from expert judgment of functional job analyses were compared to statistical profiles of the Position Analysis Questionnaire (PAQ). From the data banks of the PAQ services, 300 cases were randomly selected. In order to obtain the Equal Employment Opportunity (EEO) classification for the selected cases, the jobs were first categorized by industry. Major corporations in each of the industrial areas were selected, and personnel officers of the selected corporations were sent a questionnaire containing the Dictionary of Occupational Titles (DOT) written job descriptions. They were asked to place the jobs into one of the three EEO classifications. A discriminant analysis was performed and statistical results slightly favored the PAQ. The PAQ classification was 72 percent correct compared to 70 percent for functional job analysis. Results strongly support the notion that quantitative job analysis data can be successfully used to classify jobs into their EEO categories. The primary difference in the two systems is in their ability to correctly classify unskilled jobs, where the PAW job dimensions do considerably better than the DOT worker function scales. (JAC)

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Two Methods for Classifying Jobs into Equal Employment Opportunity Catagories

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Two Methods for Classifying Jobs
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Abstract

Two methods of job classification were assessed in a combination archival and field study. Classification results from expert judgment of functional job analyses were compared to statistical profiles of the Position Analysis Questionnaire (PAQ). A discriminant analysis was performed and statistical results slightly favor the PAQ. The PAQ classification was 72% correct as opposed to 70% for functional job analysis. Advantages and disadvantages of each method are discussed. It is concluded that the more empirical method is much stronger, on balance, for Equal Employment Opportunity judgments than the prevailing system.

TWO METHODS FOR CLASSIFYING JOBS INTO EQUAL EMPLOYMENT OPPORTUNITY CATEGORIES: AN ASSESSMENT

Most organizations planning to assess adverse impact or perform a stock analysis for affirmative action planning must correctly classify their jobs into appropriate occupational categories. Ever since the precedent-setting case of Griggs v. Duke Power Co. (1971), the assessment of adverse impact has become a critical issue for industrial psychologists. One assessment of adverse impact stems, in part, from the Hazelwood School District v. U.S. 15 FEP Case, wherein the establishment of the relevant labor force was delineated. Appropriate statistical tests for making a stock analysis were defined. One unambiguous occupational group was defined (secondary teachers). The Supreme Court favored the test of proportions between the employer occupation and the relevant labor force as a statistical test. If the employing organization's occupation was within two or three standard deviations of the relevant labor force, then this was accepted as one proof of non-discrimination.

As a decision rule, the Hazelwood case offers a legal and statistical basis for establishing a test for adverse impact that also appears consistent with the Equal Employment Opportunity (EEO) selection guidelines. That is, if an employer's proportions of members in a protected class are within two or three standard deviations of the relevant

labor force's proportions, then there is no difference between the observed and the expected proportion.

Almost all employers fill out the EEO Employer Information Report EEO-1,2,3,or 4, depending on their type of industry. The completed form contains employment data broken down by nine EEO occupational classifications (for the 1970 Census). Separate totals are required for each protected group. At present, classification is made by individual judgment based on employer knowledge of their jobs and comparison with Section 5 of the Appendix to the Equal Employment Opportunity Information Report EEO-1. This Appendix consists of general narrative descriptions of the EEO occupational categories. A short list of examples of jobs that fit into each category is provided. To illustrate, the descriptions of craft worker (skilled) is as follows:

> Craft Worker (skilled).--Manual workers of relatively high skill level having a thorough and comprehensive knowledge of the procedures involved in their work. Exercise considerable independent judgment and usually receive an extensive period of training. Includes the building trades, hourly paid supervisors and lead operators who are not members of management, mechanics and repairers, skilled machining occupations, compositors and typesetters, electricians, engravers, job setters (metal), motion picture projectionists, pattern and model makers, stationary engineers, tailors and tailoresses, and kindred workers.

Per the example above, information available to the personnelist is relatively broad and in narrative form. The only quantified information available is the functional job analyses found in the Dictionary of Occupational Titles (4th

ed. U.S. Department of Labor, 1977). In particular, this source provides scales for levels of skill for the job dimensions of data, people, and things. Whether the personnelist uses this source or not, employer jobs must be classified into their EEO categories via subjective judgment. Reliability may be a critical factor in this process (Cornelius and Lyness, 1980). Cut-offs between levels of skill for blue collar jobs require distinctions that the prevailing method cannot elaborate adequately.

A quantified job analysis system combined with appropriate statistical assessment is available and this study presents the results of a first test of this approach (c.f. Mecham and Wilcox, 1983). It should be clear that of the nine occupational categories of the 1970 Census, three were selected as most problematical to classification judgment - skilled, semiskilled, and unskilled.

Research Question

Any job classification problem involves at least two decisions. The first is the selection of the appropriate type of job analysis data on which to compare the jobs (Moore, 1982). The second decision is the selection of the appropriate data analysis model to combine the information obtained from the job analysis (Cornelius, Carron and Collins, 1979).

This study attempts to assess the accuracy of classifying jobs into three EEO occupational categories via two competing methods - the PAQ and discriminant analysis (method A) and functional job analysis and discriminant analysis (method B). When the purpose of research is to classify cases into predetermined groups, the appropriate data analysis model is discriminant analysis (Kerlinger and Pedhazur, 1973). We wish to assess which job analysis method is more accurate, and, in the long run, appropriate.

Method A: PAQ and Discriminant Analysis

Method

From the data banks of the PAQ Services, (1) 300 cases were randomly selected. The random selection was confined to the DOT categories of processing, machine trades, bench work, and structural work. PAQ job analysis data were obtained for each of the 300 cases. The PAQ is a structured job analysis instrument consisting of 194 elements (items). In its present form the PAQ was factor analyzed to yield 32 divisional dimensions and 13 overall dimensions.

In order to obtain the EEO classifications for the selected cases, the jobs were first categorized by industry. Major corporations in each of the industrial areas represented in the job sample were randomly selected. The personnel officers of the selected corporations were sent a mailed questionnaire containing the DOT written job descriptions. They were asked to place the jobs into one of

the three EEO classifications. EEO classifications for 206 of the 300 jobs were obtained.

Analysis

The analysis consisted of a stepwise multiple discriminant analysis. The predictors were the 32 PAQ divisional job dimensions. Wilks' lambda was selected as the stepwise selection criterion.

Results

The discriminant analysis yielded a multivariate F ratio of 4.71 with 32 and 376 degrees of freedom, significant at the .0001 level. Sixteen of the PAQ job dimensions entered the analysis. Table 1 contains the job dimensions selected as predictors together with their respective weights in the order in which they entered the equation. The two discriminant functions are shown in Table 2. Function 1 has a chi square value of 132.96 significant at the .001 level and function 2 has a chi square value of 27.77 significant at the .05 level.

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Tables 1 and 2

about here

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Table 3 shows the multiple classification analysis. The percentage of grouped cases correctly classified was 72.33.

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Table 3

about here

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Method B: DOT Worker Function Scales and Discriminant Analysis

Method

The same 206 jobs which were classified above were used for this test.

Analysis

The analysis consisted of a stepwise multiple discriminant analysis. The predictors were the DOT worker function scales of people, data, and things. Wilks' lambda was used as the stepwise selection criterion.

Results

The discriminant analysis yielded a multivariate F ratio of 19.06 with 6 and 402 degrees of freedom, significant at the .0001 level. Table 4 contains the worker functions together with their respective weights in the

order in which they entered into the equation. The discriminant analysis showed a canonical correlation of .62 and a chi square value of 101.14 significant at the .0001 level.

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Table 4

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Table 5 shows the results of the multiple classification analysis. The percentage of grouped cases correctly classified was 70.39.

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Table 5

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Overall Discussion

The results from methods A and B strongly support the notion that quantitative job analysis data can be successfully used to classify jobs into their EEO categories. At a minimum, the PAQ discriminant analysis (method A) and the DOT discriminant analysis (method B) agree on the EEO classifications at 144 out of 206 cases or

69.9% agreement.

A comparison of the results shows that the PAQ data are slightly more efficient and accurate than the DOT data in making these classifications. An examination of the classification tables reveals that the primary difference in the two systems is in their ability to correctly classify unskilled jobs, where the PAQ job dimensions do a considerably better job than the DOT worker function scales. This raises the possibility of a bottoming out effect in the DOT worker function scales.

EEO occupational classification guidelines appear arbitrary and vague. Personnelists can benefit from a combination of methods to improve decision accuracy and fairness. The PAQ and discriminant analysis offer an improvement over the prevailing system. It also appears that fine discriminations beteen jobs at the borderline of the EEO categories are more accurately and more consistently delineated (Potter, 1983). On balance, an empirical method that includes reliability assessment and objective replication appears to offer a stronger basis for classification. Should a court challenge to fair employment include an assessment of the relevant labor force, this assessment is only as good as the occupational classifications that make up the categories to the test (Graham-Moore and Jenkins,1983)

Reference Notes

1. 1) We wish to thank Dr. Robert C. Mecham, Director of PAQ Services for their cooperation in providing the data set for method A.

2. 2) Mecham, R. C., and Wilcox, A. C. "Predicting Exempt or Non-exempt Classification Status Under the Fair Labor Standards Act using the Position Analysis Questionnaire (PAQ): A Discriminant Analysis Approach." Unpublished manuscript, 1983.

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TABLE 1

Standardized Discriminant Functions for PAQ Data

PAQ Job Dimension	Standardized Coefficient Function 1	Function 2
Making decisions	.58394	.51172
Working in a businesslike situation	.16571	-.29004
Performing controlled manual and/or related activities	.35499	-.89255
Being alert to changing conditions	-.47078	.21628
Performing handling and/or related activities	-.20076	.41605
Engaging in general personal contact	-.24082	.25227
Controlling machines and/or processes	.27286	.38477
Being aware of environmental conditions	-.03718	-.58056
Exchanging job-related information	-.35075	.26099
Being in hazardous job situations	.20471	-.31611
Watching devices and/or materials for information	-.28782	.41916
Performing skilled and/or technical activities	.27295	-.18968
Public and/or related personal contacts	-.23658	-.19787
Engaging in personally demanding situations	.22217	.42939
Wearing specified vs optional apparel	-.14780	-.43353
General physical coordination	.11499	.37507

TABLE 2

Canonical Discriminant Functions for PAQ Data

Function	Canonical Correlation	Wilks Lambda	Chi-Squared	Df	Significance
1	.64273	.50917	131.96	32	.0000
2	.36390	.86757	27.77	15	.0230

TABLE 3

Classification Results from Discriminant Analysis Using PAQ Data

		Predicted EEO Group Membership					
	Total	Skilled		Semiskilled		Unskilled	
Actual Group	N	N	%	N	%	N	%
Skilled	95	72	75.8	19	20.0	4	4.2
Semiskilled	95	18	18.9	68	71.6	9	9.5
Unskilled	16	3	18.8	4	25.0	9	56.3

TABLE 4

Standardized Discriminant Functions for DOT Data

DOT Variables	Standardized Coefficient Function 1	Function 2
Data	.67998	-1.20115
Things	.54200	.85946
People	-.03839	1.01409

TABLE 5

Classification Results from Discriminant Analysis Using DOT Data

		Predicted EEO Group Membership					
	Total	Skilled		Semiskilled		Unskilled	
Actual Group	N	N	%	N	%	N	%
Skilled	95	73	76.8	19	20.0	3	3.2
Semiskilled	95	22	23.2	67	70.5	6	6.3
Unskilled	16	2	12.5	9	56.3	5	31.3